A NEW *SISYRINCHIUM* (IRIDACEAE) FROM CEDAR GLADES IN NORTHERN ALABAMA

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ABSTRACT

Sisyrinchium calciphilum Sorrie is described from a three county area of northwestern Alabama. The new species resembles *S. albidum* and *S. capillare* in possessing paired inflorescences, but is readily distinguished by a suite of characters. It is restricted to limestone cedar glades and semi-open limestone slopes.

RESUMEN

Se describe Sisyrinchium calciphilum Sorrie de un área de tres condados en el noroeste de Alabama. La nueva especie se parece a *S. albidum* y *S. capillare* por tener inflorescencias en pares, pero se distingue fácilmente por un conjunto de caracteres. Está restringida a calizas en claros de cedros y laderas semiabiertas.

Sisyrinchium L. is a taxonomically difficult genus with 37 species in North America north of Mexico. Of these, only *Sisyrinchium albidum* Raf. and *S. capillare* Bicknell have paired inflorescences (Cholewa & Henderson 2002). Each of the inflorescences is subtended by two bracts or spathes, which terminate the unbranched stems. Although this combination of characters is rare in North American *Sisyrinchium*, a third entity shares these character states and is the subject of this paper. We propose *Sisyrinchium calciphilum* Sorrie for this species, which is endemic to limestone glades in northwestern Alabama.

Sisyrinchium calciphilum Sorrie, sp. nov. (**Fig. 1**). TYPE: ALABAMA: LAWRENCE CO.: Prairie Grove Glades Preserve, common in moist grassy areas of open limestone cedar glade, 16 Apr 2011, *B. Sorrie, D. Estes, & W. Knapp 12742* (HOLOTYPE: NCU; ISOTYPES: APSC, GH, MO, UNA, VDB/BRIT).

Plants: perennial, cespitose, 20–42 cm tall. Stems simple, clearly but narrowly winged, 0.7–1.3(–1.5) mm wide, each wing wider than stem core, glabrous, margins entire, stem base purple to pinkish brown. **Leaves:** glabrous, bases not persistent as fibrous tufts. **Inflorescences:** paired one sided cymes, i.e., rhiphidia, each subtended by a pair of spathes, these subtended by a bractlike leaf 41–82 mm long that often obscures inner inflorescence; bractlike leaf and spathes purple tinged, spiculate, spathe keels denticulate, outer spathe of outer pair 12–18 mm, spathes of outer inflorescences averaging 4.4 mm longer than spathes of inner inflorescences, spathe margins hyaline, translucent to purple. **Flowers:** tepals blue with yellow bases, 7–9 mm long, apex weakly emarginate, aristate; filaments connate most of length, egandular; ovary green and glandular-hairy. **Capsules:** fully mature capsules not seen; immature capsules more-or-less globose, 4–5 mm long and wide, pale green, pedicels spreading to ascending, glabrous or with very sparse glandular hairs. **Seeds:** mature seeds not seen.

Fig. 1. Holotype of *Sisyrinchium calciphilum* Sorrie; *B. Sorrie, D. Estes, & W. Knapp 12742* (holotype, NCU). [digital image]

Additional specimens examined: **ALABAMA. Franklin Co.:** ca. 6 mi E of Russellville, moist open area on Newburg Glade, 28 Apr 1993, *R. Whetstone, D. Spaulding, J. Ballard, & T. Dobson 16395* (JSU). **Lawrence Co.:** S of Wren, Alabama 33 ca. 1.2 mi N of Bankhead National Forest, xeric limestone outcrop, 23 May 1974, *R. Whetstone & T. Atkinson* 2823 (JSU); pasture near Mt. Hope and County Road 99, limestone slopes,

27 Apr 1993, *R. Whetstone, D. Spaulding, J. Ballard, & T. Dobson 16436* (JSU); N of Courtland, just S of Wheeler Station Sporting Clays, recently burned oak-hickory flatwoods, 4 May 1996, *R. Whetstone & S. Hruska 17457* (JSU); Prairie Grove Glades Preserve, abundant on thin clay soil over outcrops, flowers blue, 19 Apr 2003, *R. Kral 93898* (AMAL, APSC); 2 mi SE of Speake on Alabama 157, clearing in limestone woods, 23 Apr 1968, *R. Kral 30489* (GA); 1.5 mi SW of Flat Rock, limestone cedar glade, tepals dark purple, 17 Apr 2006, *B. Keener & D. Spaulding 2817* (AMAL, UNA); Bankhead National Forest, off FSR-264, limestone woods, 17 Apr 2005, *D. Spaulding & B. Keener 12252* (AUA,UNA). **Morgan Co.:** disturbed edge of "Crusher Glade" adjacent to dry limestone woods, off County Road 38, 29 Mar 1997, *D. Spaulding, R. Whetstone, J. Ballard, & T. Ballard 9587* (AMAL); Massey, CR-55 near Emmanuel Road, disturbed limestone glade, 13 Apr 2003, *D. Spaulding 11723* (AMAL, UNA); roadside glade on Cedar Plains Road E of Massey, 16 Apr 2011, *B. Sorrie, D. Estes, & W. Knapp 12746* (DUKE, GA, NCSC, NCU, US); East Lacon Road, limestone outcrops on slope in dryish woods, 16 Apr 2011, *B. Sorrie, D. Estes, & W. Knapp 12747* (NCU, NY).

Sisyrinchium albidum was the first of the blue-eyed-grasses with paired inflorescences to be named (Rafinesque 1832). Much later, Bicknell split out *S. capillare* with its wiry, barely winged stems (Bicknell 1899). Since there appeared to be overlapping characters between these two species, some authors declined to recognize *S. capillare* (e.g., Radford et al. 1968) or confounded their habitats and ranges (Cholewa & Henderson 2002). Recent herbarium and field work by the authors show that *S. capillare* occurs strictly in the Atlantic Coastal Plain Physiographic Province whereas *S. albidum* occurs primarily in the Piedmont, Interior Low Plateau, and Interior Highlands Physiographic Provinces, northward to the Great Lakes states; and with populations southward to the Gulf Coastal Plain (Fig. 6). In addition, there are strong morphological differences, notably the slender and nearly wingless stem of *S. capillare* (vs. clearly winged in *S. albidum*), stem with dense fibrous remains of leaves (vs glabrous to only moderately dense), nearly equal spathes (vs. very unequal), and short outermost spathe (vs. long) (Table 1). Note that Table 1 divides *S. albidum* into two groups, east and west of the Appalachian Mountains. These groups appear to differ from each other, notably in stem width and the difference between inner and outer spathe length, but there is much overlap. At this time we are reluctant to recognize any infraspecific taxa and treat *S. albidum* as a widespread, variable species.

Specimens of *S. calciphilum* are quite different from *S. capillare*, where they had been placed due to their slender stems. Stems of *S. calciphilum* are definitely (albeit narrowly) winged, the fibrous remains of leaf bases are absent, the two outer spathes exceed the two inner by a mean of 4.4 mm, spathes and leaflike bracts are strongly purple tinged and spiculate. Corolla color of *S. calciphilum* is medium blue, unlike the pale blue to whitish color of *S. capillare* (Figs. 2 & 3). Moreover, *S. calciphilum* is restricted to high pH limestone glades, whereas *S. capillare* to acidic, fire-maintained longleaf pine savannas (Table 1).

Compared with *S. albidum*, *S. calciphilum* is less strikingly distinct. While a single morphological character may match the eastern or western populations of *S. albidum*, the suite of characters distinguishes *S. calciphilum* (Table 1). Critical differences are: stem width of *S. calciphilum* is similar to that of many plants from east of the Appalachians, but only half as wide as sympatric plants from west of the Appalachians. Stem margins of *S. calciphilum* are smooth, but denticulate (often strongly so) in *S. albidum*. The difference between the two inner and two outer spathe lengths of *S. calciphilum* is on average the same as plants from west of the Appalachians, but almost double that of plants from east of the Appalachians. Corolla color of *S. calciphilum* is medium blue, unlike the pale blue to whitish color of *S. albidum* (Figs. 2 & 4). Coupled with the restricted range and habitat preference, these morphological differences are significant at the species level.

KEY TO *SISYRINCHIUM* WITH PAIRED INFLORESCENCES

1. Stems obviously winged, each wing wider than stem core; outer spathe pair longer than inner by 2.3 mm (average) or more
   2. Stems mostly 1.0–2.5 mm wide, margins denticulate; corolla pale blue to whitish ____ **S. albidum**
   2. Stems mostly 0.7–1.3 mm wide, margins smooth; corolla medium blue ____ **S. calciphilum**
1. Stems not winged or scarcely so, each wing narrower than stem core; outer spathe pair about equal in length to inner pair ____ **S. capillare**

DISTRIBUTION AND HABITAT

Sisyrinchium calciphilum is endemic to three counties in northwestern Alabama (Fig. 5), a region underlain by Mississippian limestone and known to support a number of limestone glades. Associated species include *Carex cherokeensis* Schwein., *Dalea gattingeri* (A. Heller) Barneby, *Forestiera ligustrina* (Michx.) Poir., *Juniperus virginiana* L., *Leavenworthia alabamica* Rollins, *L. crassa* Rollins, *Linum sulcatum* Riddell, *Minuartia patula* (Michx.)

Fig. 2. *Sisyrinchium calciphilum*, Lawrence County, Alabama. Photos Wayne Barger.

Fig. 3. *Sisyrinchium capillare*, Pender County, North Carolina. Photo Bruce Sorrie.

Fig. 4. *Sisyrinchium albidum*, Stanly County, North Carolina. Photo Bruce Sorrie.

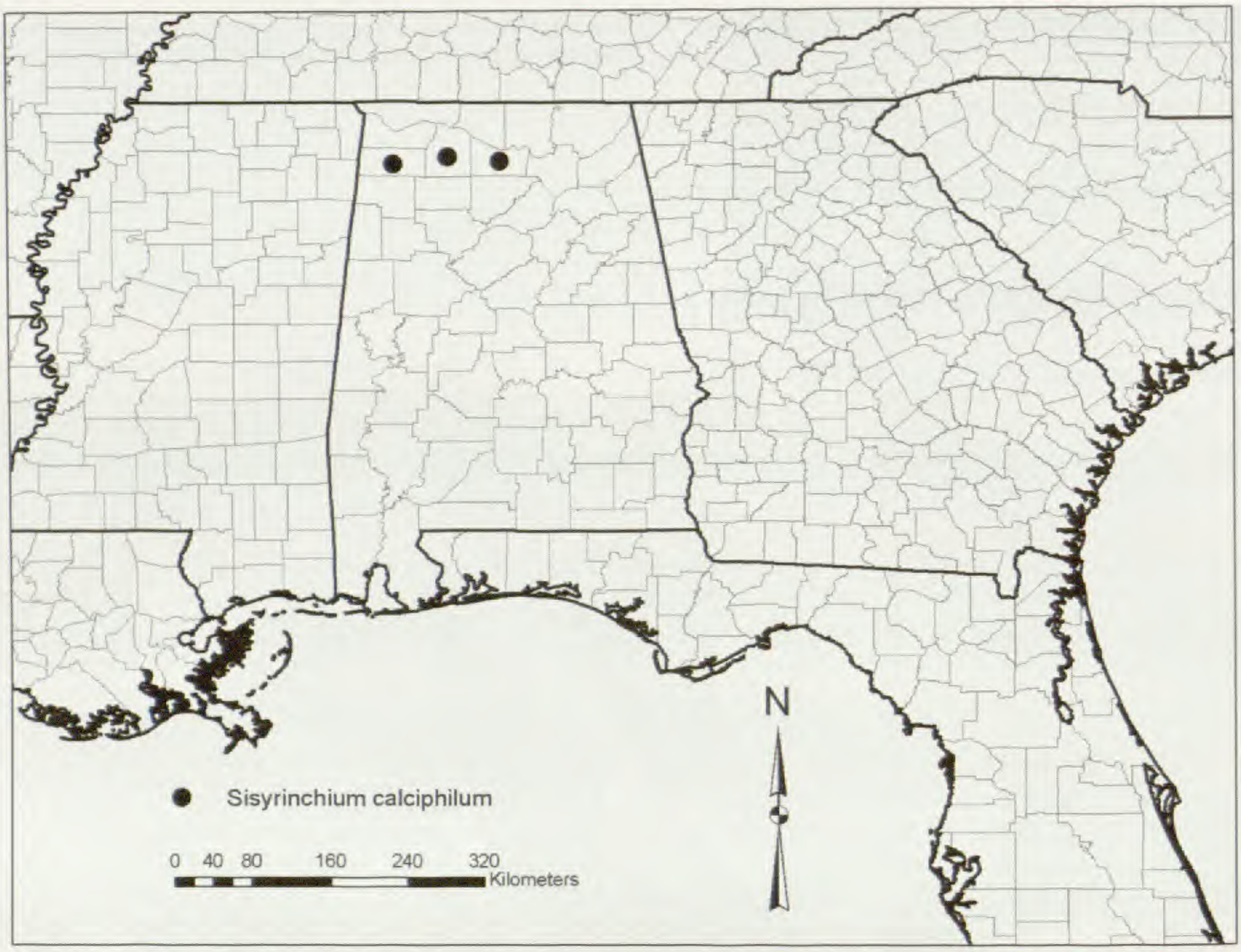

Fig. 5. Range map of *Sisyrinchium calciphilum*.

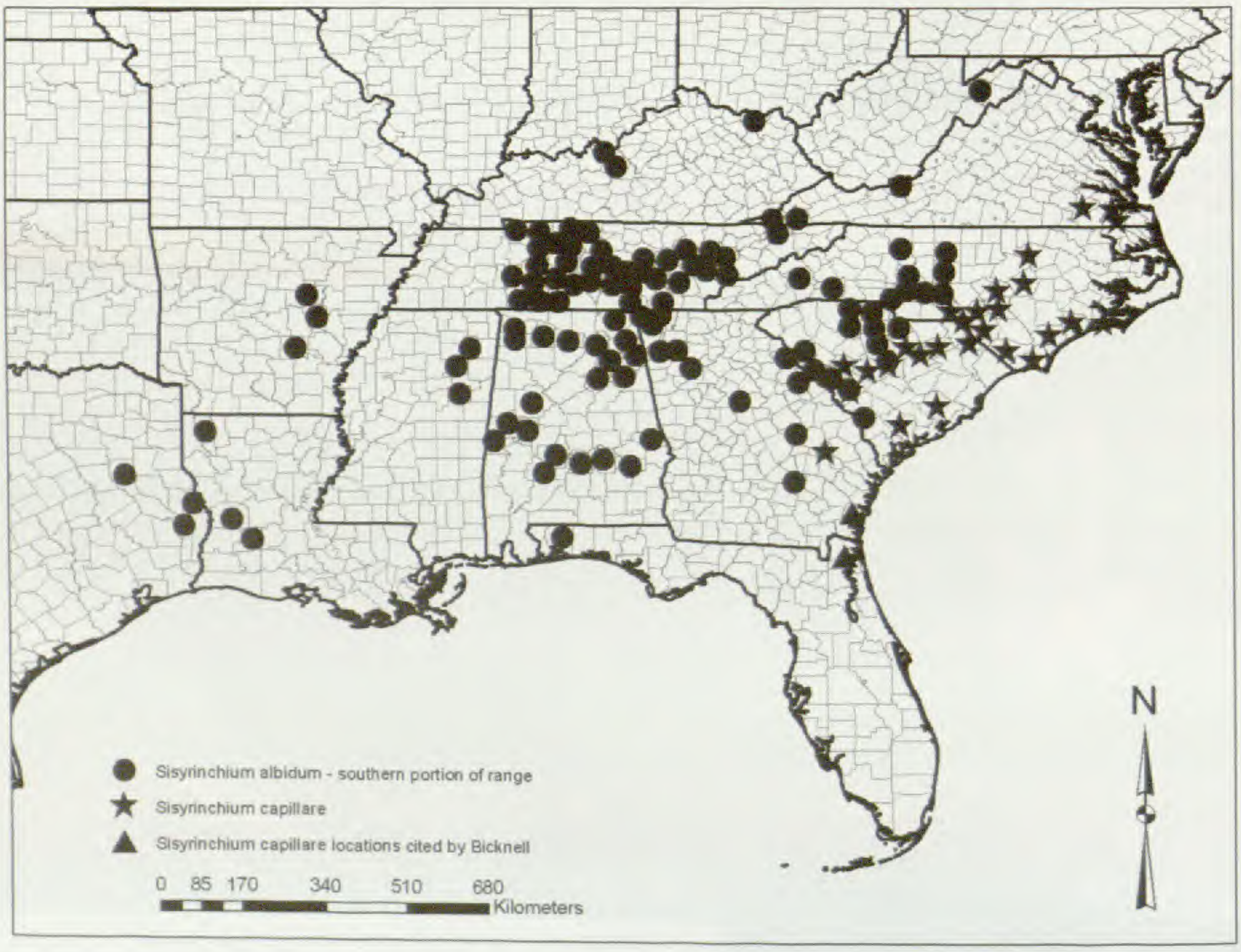

Fig. 6. Range map of *Sisyrinchium capillare* and *S. albidum* (southeastern states only).

TABLE 1. Comparison of *Sisyrinchium albidum, S. capillare,* and *S. calciphilum. Sisyrinchium albidum* has been divided into two populations, east and west of the Appalachian Mountains; these populations without taxonomic status. Measurements are in millimeters, n=25 measurements per species.

Character	*S. calciphilum*	*S. capillare*	*S. albidum* E of Appalachians	*S. albidum* W of Appalachians
Stem width: range; mean	0.7–1.3(–1.5) 1.1	0.6–1.0(–1.2) 0.85	(0.8–)1.0–1.9(–2.2) 1.3	(1.2–)1.5–2.5(–2.8) 1.9
Stem winged	Yes; each wing wider than stem core, rarely equal	No, or barely; each wing narrower than stem core	Yes; each wing wider than or equal to stem core	Yes; each wing much wider than stem core
Stem margins denticulate	No	No	Yes; sometimes no	Yes; rarely no
Old leaf bases fibrous	No; 0/25 plants usually dense	Yes, 25/25 plants, sparse to moderately dense	Variable; 10/25 plants, sparse to moderately dense	Usually not; 4/25 plants,
Stem base and leaf base color	Purple, pinkish brown	Brown, occasionally pinkish brown	Brown, pinkish brown, purple	Purple, pinkish brown, brown
2 outer spathes > 2 inner (mean distance)	4.4	Nearly equal; about 1 mm longer or shorter	2.3	4.4
Outermost spathe length: range; mean	12–18(–20) 15.2	12–17 13.7	12–18(–22) 15.1	15–22(–25) 18.8
Spathes and leaflike bract spiculate	Yes	No	Yes	Yes
Spathes and leaflike bract purple-tinged	Yes	No	Usually; 20/25 plants purplish	Variable; 14/25 plants purplish
Glandular hairs on ovary and base of corolla	Yes	No	Usually; 19/25 with hairs	Variable; 10/25 with hairs
Corolla color	Blue, yellow basally	Pale blue to whitish, yellow basally	Pale blue to whitish, yellow basally	Pale blue to whitish, yellow basally
Habitat	Limestone cedar glades, rocky limestone woodlands	Fire-prone longleaf pine savannas; strictly coastal plain	Openings in rocky oak-hickory-pine forests, granitic outcrops, powerlines	Prairies, oak glades, cedar-glades, openings in rocky oak hickory-pine forests

Mattf.,*Quercus muehlenbergii* Engelm., *Schizachyrium scoparium* (Michx.) Nash, *Schoenolirion croceum* (Michx.) A. Wood, *Scutellaria leonardii* Epling, *Sporobolus neglectus* Nash, and *S. vaginiflorus* (Torr. ex A. Gray) A. Wood. *Sisyrinchium albidum* has also been collected in the same three counties, but is not known to co-occur with *S. calciphilum*.

ACKNOWLEDGMENTS

We thank curators and staff of the following herbaria for loans and/or data-sharing: AMAL, APSC, AUA, DUKE, FSU, GA, JSU, NCU, TENN, UNA, USCH. Steve Seiberling of UNC-Chapel Hill provided the image of the holotype. Wayne Barger kindly provided images of *S. calciphilum* from the type site. Anita Chowela, Robert Cruden, and two anonymous reviewers substantially improved the manuscript.

REFERENCES

BICKNELL, E.P. 1899. Studies in *Sisyrinchium*-VI: additional new species from the southern states. Bull. Torrey Bot. Club 26:605–616.

CHOLEWA, A.F. AND D.M. HENDERSON. 2002. *Sisyrinchium*. In: Flora of North America north of Mexico. Vol. 26, Magnoliophyta: Liliidae: Liliales and Orchidales. Oxford University Press, New York.

RADFORD, A.E., H.E. AHLES, AND C.R. BELL. 1968. Manual of the vascular flora of the Carolinas. University of North Carolina Press, Chapel Hill.

RAFINESQUE, C.S. 1832. *Sisyrinchium albidum*. Atlantic J. 1:17–18.